Survivability/Vulnerability Information Analysis Center

SURVIAC Bulletin

Volume XVI Issue 1 - 2005

SURVIAC is a U.S. Department of Defense Information Analysis Center (IAC) sponsored by the Defense Information Systems Agency (DISA), Defense Technical Information Center (DTIC).

New Model Versions Available from SURVIAC

SURVIAC began distributing the newest version of ALARM, Version 5.0, BLUEMAX, Version 5 Release 1.0, and RADGUNS, Version 2.4 in August 2004. These programs and their upgrades were funded by the Joint Aircraft Survivability Program Office (JASPO).

ALARM 5.0

The new version of ALARM is an upgrade from ALARM 4.5. ALARM is a generic digital computer simulation designed to evaluate the performance of a ground-based radar system attempting to detect low altitude aircraft. A few of the significant new features and improvements included in ALARM 5.0 include:

- **New Radar Types.** A Moving Target Detector (MTD) was added. This is a combination of Moving Target Indicator (MTI) and pulse Doppler, plus an additional processing channel for a zero velocity filter (ZVF). A continuous-wave (CW) was also added.

- **Antennas.** The antenna pointing controls have been expanded. Transmit and receive antennas can be configured independently of each other. This change is fully backward compatible. Transmit and receive antennas can have different antenna patterns, antenna heights and pointing angles.

- **EARCE 2.5.** The ESAMS, ALARM, and RADGUNS Common RF Environment (EARCE) source code in ALARM was updated to EARCE Version 2.5.

- **New Terrain Processing.** Support for DTED Level 2 data was added. The DTED level can be set using the new input TERRAIN_LEVEL. The default is level 1.

- **New Utility Program.** A new utility program FilterChart is used to plot the filter response of a radar.

BLUEMAX 5 Release 1.0

This new version of BLUEMAX is an upgrade from BLUEMAX IV Release 1.0, released June 1999. BLUEMAX is an aircraft flight path generator and mission performance evaluation model. BLUEMAX is a useful tool with which a user can construct detailed flight paths for fixed-wing aircraft for input into models such as ESAMS, ALARM, and RADGUNS. The model is also useful as a standalone tool for determining aircraft performance characteristics.

The significant new features and improvements included in BLUEMAX 5 Release 1.0 include:

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Report Documentation Page

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NDIA CSD UAV Survivability Enhancement Workshop Findings

In the last bulletin we described a workshop on UAV survivability enhancement that the National Defense Industrial Association's (NDIA) Combat Survivability Division (CSD) conducted on 29 April 2004. The findings and recommendations from the workshop have now been documented.

The workshop was successful in achieving the objectives set forth during the day of the workshop. The breakout sessions discussed the current status of UAV systems and survivability.

The survivability breakout session considered the missions and operating environments of key UAV platform types in order to identify relevant vulnerability reduction techniques as well as means to reduce susceptibility. This session completed an overview of survivability features in principle as potential enhancements to the five various types of UAV systems. The most worthy cost effective survivability enhancements from Table 1 were prioritized for each UAV type. The top enhancements on this list were deemed the most overall cost effective to be considered for incorporation into the respective UAV designs. This prioritized list is the distilled judgment of the survivability experts at this workshop. This table should be an excellent starting point for any UAV program considering survivability enhancements.

The UAV systems breakout session considered the design, mission requirement, threat, and life cycle state of each system as it might pertain to the potential willingness/need for that system to incorporate survivability enhancements. Combat incidents involving a specific or similar type UAV were considered. The inherent survivability of the specific design of a system was weighed along with the potential for encountering threats. The perception of the UAV program and users willingness to consider survivability enhancements was another important factor.

Northrop Grumman Photo

This session resulted in a prioritized list of UAV systems that were considered to be the best candidates to considering survivability enhancements. This list is shown in Table 2. The UAV systems deemed most receptive are listed at the top of the list. This is not to say that any system is less survivable

UAV Findings continued on page 4

Table 1. Prioritized Survivability Enhancement Features

Priority Rank	UAV Category				
	Small	Tactical	Large	UCAV	Rotary
1	Acoustic Signature Reduction	Acoustic Signature Reduction	Situation Awareness / Threat Avoidance	IR/RF Signature Reduction	Acoustic Signature Reduction
2	Visual Signature Reduction	Visual Signature Reduction	IRCM/RFCM	Separation & Redundancy	RF Signature Reduction
3	Info Assurances	IR Signature Reduction	Separation & Redundancy	Situation Awareness / Threat Avoidance	IR Signature Reduction
4	Situation Awareness / Threat Avoidance	RF Signature Reduction	Passive Fire Suppression	IRCM/RFCM	Separation & Redundancy
5	Mission Planning/Tactics	Situation Awareness / Threat Avoidance	_____	Active Fire Suppression	IRCM / RFCM
6	_____	Separation & Redundancy	_____	_____	System Ballistic Tolerance

UAV Findings continued from page 3

than any other. Rather, this list reflects the judgment of the UAV experts at this workshop, that the mission of this particular UAV could encourage the program office to favorably consider additional survivability and that the program due to a combination of design philosophy, operational history, and management is most receptive to seriously considering survivability enhancements.

The workshop attendees agreed on two recommendations. The first recommendation is that each UAV system at least formally consider survivability enhancement. It was not recommended to single mindedly advocate survivability at all cost, just that it be fairly and formally weighted along with other key system design tradeoffs.

The second recommendation is to commission a study to take the workshop findings and further refine cost benefit survivability tradeoffs for a few specific UAV candidate systems. SURVIAC and JASPO may be sources of information or execution. The Defense Science Board, or the NDIA CSD, or JASPO may possibly conduct the study. These recommendations have been forwarded to appropriate OSD offices for action.

For further information, please call:
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DISCLAIMER: The findings and recommendations of this NDIA workshop are not necessarily endorsed by the Armed Forces. These are only suggested courses of action in the context of survivability and do not imply current or future directions for the military services.

Table 2. Candidate UAV Systems to Incorporate More Survivability

Priority	UAV Category	System	Mission/ Threats/ Maturity
1	Large Scale	Predator B (AF)	Hunter Killer/Tactical Threats/ In Development
1	Large Scale	BAMS (Navy)	ISR/Tactical Threats/ In Development
1	UCAV	J-UCAS (AF)	EW, EA, SEAD, Strike / Tactical Threats/ Developmental
1	UCAV	J-UCAS (Navy)	Carrier Based ISR, SEAD, Strike / Tactical Threats/ Developmental
1	Tactical	ERMP (Army)	Hunter Killer, ISR, ACN/ Small, ADA, Tactical/ Developmental
1	Rotor Craft	Fire Scout (Navy and Army)	ISR w Hunter Killer and ACN/Small, ADA, Tactical/ Developmental
1	Rotor Craft	UCAR (Army)	Hunter Killer/ Small, ADA, Tactical/ Developmental
2	Large Scale	Global Hawk (AF)	ISR/Strategic Threats/Spiral Development and In Production, Deployed in OIF
2	Tactical	Shadow (Army)	ISR/ Small, ADA, Tactical/ In Production and Deployed
2	Tactical	Hunter (Army)	ISR with Hunter Killer/ Small, ADA, Tactical/ Deployed
2	Tactical	Predator (AF)	ISR and Hunter Killer/ ADA, Tactical/ In Production Deployed
2	Small/Handheld	Silver Fox (Army/USMC)	ISR/ Small/ In Development and Deployed
3	Tactical	Pioneer (USMC)	ISR/ Small, ADA, Tactical/ In Production and Deployed
3	Small/Handheld	Raven (Army)	ISR/ Small/ Deployed
3	Small/Handheld	Dragon Eye (USMC)	ISR/ Small/ Deployed
3	Small/Handheld	Pointer (Army)	ISR/ Small/ Deployed
3	Small/Handheld	Desert Hawk (AF)	ISR/ Small/ Deployed

1=High 2=Medium 3=Low

2005 SURVIAC Survivability Analysis Workshop
4-8 April 2005
Wright-Patterson AFB, Ohio

For more information, contact Linda Ryan, liryan@bah.com, (937) 255-3828 ext. 208

(see page 9 for more details!)

The new updated SURVIAC Model Guide is ready for distribution. For a hard copy, please fill out the form on the back of this bulletin. To download an electronic copy of the Model Guide in .pdf format, please visit our website at: http://iac.dtic.mil/surviac

First Joint Test & Evaluation Program Quick Reaction Test (QRT) completes testing

By Mr. Jim Thompson, JT&E Program Manager, DOT&E

The Joint Survivability (JSURV) Quick Reaction Test (QRT) completed testing as the first QRT sanctioned under the JT&E Program Office reengineering effort. JSURV investigated and provided solutions to the problems of casualty-producing incidents sustained by U.S. Forces occupying Iraq.

JSURV completed its testing in March 2004 and delivered its products to warfighters participating in Operation Iraqi Freedom (OIF). These included recommended changes to U.S. Forces techniques, tactics, and procedures (TTPs) and materiel, development of combat convoy handbooks, graphic training aids, body armor, and vehicle fire suppression technologies. The JSURV Team provided direct assistance to the U.S. Central Command (USCENTCOM), U.S. Special Operations Command (USSOCOM), and the Services to implement the recommendations that have, since implementation, contributed to the reduction of casualties in the OIF theater of operations.

The JSURV JT&E effort represented the first program chartered and executed under the JT&E Program office process to bring together efforts that would address joint warfighter needs quickly, and deliver back to the warfighters products that solve these problems in a timely manner.

In addition, the JT&E Program office sanctioned its newest QRT, the Joint Shipboard Weapons and Ordnance (JSWORD) QRT, as the newest program formed under the JT&E streamlined test process. To help meet the military's increased tempo of joint operations around the world, JSWORD will examine the joint issues of the use and deployment of Army and Special Operations Command (SOCOM) 2.75" Folding Fin Aerial Rockets (FFAR) aboard U.S. Navy ships. Current joint operations with these weapons require waivers to be granted by the Navy to deploy with them aboard ship. JSWORD will develop processes and procedures that enable these weapons to be utilized, satisfy each service's requirements, and eliminate the need for waivers, while not impacting the safety and effectiveness of the joint operation.

For more information, please visit http://www.jte.osd.mil.

JASP Aircraft Combat Survivability Short Course to be held

The Joint Aircraft Survivability Program (JASP) and the Survivability Vulnerability Information Analysis Center (SURVIAC) are sponsoring a three-day Aircraft Combat Survivability Short Course to be held 26-28 July 2005. The course will be held at Wright-Patterson AFB, Ohio. This orientation course is for engineers and others in Government or Industry who would like to learn more about the aircraft combat survivability discipline. The course will cover a broad spectrum of topics including:

- Introduction to survivability
- The essentials of aircraft combat survivability
- Modeling and Simulations for survivability
- Current technology focus areas for survivability
- Joint Live Fire for aircraft systems
- Support for Validation, Verification & Accreditation of models

There is no course fee. A small charge may be required to cover incidentals. Registration will be limited to seventy-five. For any questions or to obtain a registration form, please call or email Darnell Marbury at (703) 607-3509 x10, email darnell.marbury@navy.mil.

This announcement and additional information such as registration form and draft agenda is located on the JASPO website at http://jas.jcs.mil/. Additional details will be provided prior to the course for those registered.

New Model Versions Released

Brawler, Version 6.5.1
and
ESAMS, Version 3.1

Watch for more information
in our next issue
of the
SURVIAC Bulletin

Model Releases continued from page 1

BLUEMAX 5

- **Coordinate Systems.** In conjunction with the BLUEMAX, ESAMS, ALARM, RADGUNS, and DIME (BEARD) alliance, the inertial and body coordinate systems have been changed to comply with the BEARD standard. This new standard will avoid the nuisance of converting coordinate systems between new versions of the alliance models. The inertial coordinate system is north (X), east (Y), and down (Z) (NED) and the body coordinates are nose (X), right wing (Y), and down (Z) (NRD).

- **Quaternion Motion Model.** A Quaternion motion model has been implemented to compute the aircraft Euler angles (Phi, Theta, Psi) and eliminate the singularity at Theta = 90 deg.

- **New Terrain Processing.** The terrain module in BLUEMAX has been upgraded to the latest version from the ESAMS, ALARM, RADGUNS Common Environment (EARCE) version 2.5. This module allows for raw Digital Terrain Elevation Data (DTED) to be read directly from CD-ROM or from the hard disk. The location of the terrain data is defined in the Dirpaths.dat file located in the BLUEMAX Bin Directory.

- **Aircraft Data File Update.** The aircraft data file format has been modified to allow for a "free format" input structure. Unlimited comment lines can be added before the constants table or before any data table indicated by a '#' sign in first column. Tables can be customized to be a function of X, Y, and Z parameters in any ordered determined by the user. Other modifications have been made to enhance the fuels (internal and external) and stores (internal and external) management system. Additional data tables have been added for improved model fidelity.

- **Aero-Performance Module and Plot Macro.** An aero-performance option has been added to the list of functions within BLUEMAX 5. This option generates output for: specific excess power (Ps), sustained g-factor (Gs), turn rate, specific range (Rs), and Breguet Range. When the aero-performance option is selected, a Microsoft Excel output file is generated for plotting purposes.

- **Interface Control Document.** Included with the BLUEMAX 5 Source Code is an Interface Control Document (bm5icd.txt) that explains how to interface BLUEMAX 5 with other models (i.e., ESAMS, RADGUNS, SUPPRESSOR, JIMM, etc) for Constructive or Virtual Analysis.

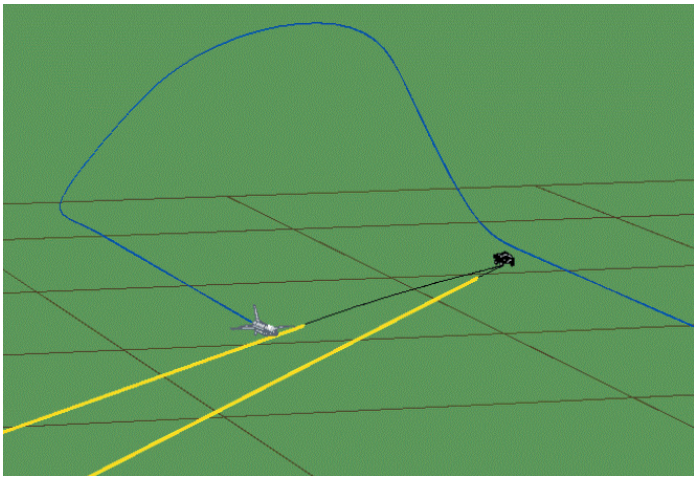
- **Windows Graphical User Interface (GUI).** For PC users, the Windows GUI for the BLUEMAX 5 model has been enhanced to include a fuels and stores management input, conversion tools, as well as enhancements to existing model functions.

- **FDash Virtual Interface.** BLUEMAX 5 has been integrated with FDash (Fast Display Architecture for Simulation), a real-time virtual display interface. The FDash virtual interface allows the user to execute BLUEMAX 5 in real-time operator-in-the-loop or autopilot mode or in post-process mode as a replay utility.

RADGUNS 2.4

This new version of RADGUNS is an upgrade from RADGUNS 2.3, released September, 2001. RADGUNS is a simulation of air-defense artillery (ADA) vs. an aerial (or ground-based) target. RADGUNS has been placed in a maintenance mode and no new gun models were added in Version 2.4. However, this new version does offer improvements and additions over its Version 2.3 predecessor. The following list outlines the key new features and changes in RADGUNS Version 2.4:

- The installation process for RADGUNS has been greatly simplified. For Windows, Linux, and Sun users, an installation wizard is included on the CD-ROM. Simply run the installation application and follow the prompts to complete the installation. All environment variables will automatically be setup appropriately. For Irix and other Unix systems, a .tar file is provided with simple instructions. Compiled executables are provided for Windows, Linux, Solaris, and IRIX.



RADGUNS

- The ESAMS, ALARM, and RADGUNS Common RF Environment (EARCE) source code in RADGUNS was updated to EARCE Version 2.5.

- Software change requests reported by RADGUNS end users (from http://bahdayton.com/scr) for both source code and documentation were included in RADGUNS 2.4.

- The RADGUNS documentation set was updated to reflect all changes including Intel updates from the National Ground Intelligence Center (NGIC).

- Two new post-processing tools are included with version 2.4. A Java-based tool that processes RADGUNS event output files and pulls standard Measures of Effectiveness (MOE) data into tab-delimited files. These files are built to import directly into Microsoft Excel. MOE's include detection range, rounds fired, probability of hit, and probability of kill values. Tables are created for multiple offsets and altitudes and can process both SINGL and MULTI run types. Another tool is included that can read post-processed output and automatically plot Ph/Pk maps in Matlab. Refer to the readme file provided for details on these post-processors.

- Weapon data updates were provided from NGIC and incorporated into the RADGUNS .wpn files for the 2S6F and Skyguard weapons.

- Input file and output file formats were not changed from version 2.3. RADGUNS 2.3 .par and .pva files will still work with RADGUNS 2.4.

- Support for the new BLUEMAX 5 ESAMS-ALARM-RADGUNS (EAR) output files format. The BLUEMAX 4 .EAR output format is still supported.

You can obtain the new version of ALARM, BLUEMAX and RADGUNS from SURVIAC.

SURVIAC can be reached at (937) 255-3828, DSN 785-3828. Order requests can be directed to Mr. A.J. Brown at extension 284 while technical questions should be directed to Mr. Michael Bennett at (937) 781-2820 for BLUEMAX and RADGUNS and to Barry Vincent at (937) 255-3828, DSN 785-3828 ext. 283 for ALARM.

NDIA Combat Survivability Division Leadership to Change

RADM Robert Gormley

Rear Admiral Robert H. Gormley, USN (Ret), the major impetus behind the establishment and operation of the Combat Survivability Division, announced at the 18 May 04 Division Executive Board meeting his intention to step down from the Chairman position. Adm Gormley said he intends to resign from the Executive Board on 2 December 2004 following the conclusion of the NDIA Aircraft Survivability 2004 symposium in Monterey, California. During his 16-year tenure, the Division became a major advocate for increased aircraft survivability and provided an annual forum for discussion of the hottest survivability topics at its annual symposium.

The Division formation culminated organizational efforts that began in Monterey at the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS) Aircraft Combat Survivability Symposium held in Dec 87. Proposed by Adm Gormley, a survey conducted at the symposium showed most attendees were in favor of an aircraft survivability association. There were indications, however, that the scope of such an organization should be broadened to include land warfare and ship systems, and that affiliation with a prominent existing organization should also be considered.

To address these two suggestions, a second, more comprehensive survey questionnaire was sent to recipients in both government and industry. The overwhelming response was a preference for a survivability professional association to be formed and an all-systems approach, i.e. air, land and ship adopted. The question of independence or affiliation with an existing association was divided about equally with the American Defense Preparedness Association (ADPA) a clear leader among those preferring the affiliation approach. When Adm Gormley approached the president of ADPA with the idea of forming an ADPA Combat Survivability Division, his idea was enthusiastically embraced. Further, the Division was promised a free hand in running its affairs, all in recognition of the heightened importance of survivability in both modern warfare and the DoD acquisition process.

Thus, the ADPA, now National Defense Industrial Association (NDIA), Combat Survivability Division was born! The Division's mission is "to enhance survivability as an essential element of overall combat mission effectiveness. This involves promoting communications and the exchange of survivability technical information between individuals and organizations that develop requirements for, design, build and tactically employ military weapon systems". Regular Division meetings, chaired by Adm Gormley, began in 1988, and its first national symposium was planned and executed in Sep 89 at Johns Hopkins Kossiakoff Center on the theme "Combat Survivability: Challenges and Opportunities." Thus began the continuing series of survivability symposia that originally alternated the site between the East and West coasts. Ultimately, the Division settled on Monterey as its location for the annual event.

Under Admiral Gormley's leadership the Division matured in its advocacy of weapon system survivability. The Aircraft Survivability Symposium in the Fall at the Naval Postgraduate School is widely anticipated each year with the slogan "If you are in the Survivability business…the place to be is Monterey in November". Another standard feature annually is the presentation of the NDIA Combat Survivability Awards. Over the years 20 individuals have been honored for their contributions to combat survivability for Leadership, Technical Achievement and Lifetime Achievement. The awardees have been involved in technical areas across the spectrum from low observables to low vulnerability. In recent years, the Division has concentrated on aircraft survivability and now works closely with the Association for Unmanned Vehicle Systems International to focus on unmanned vehicle survivability and operations within the low-altitude battlespace.

Adm Gormley is eminently qualified to head up efforts to promote survivability as a critical element of modern warfare. He studied at the U.S. Naval Academy and Harvard University and was awarded degrees by both institutions. A former career naval officer and Naval Aviator, he commanded the aircraft carrier John F. Kennedy, a combat stores ship, an air wing, and a fighter squadron during the Vietnam War. During that period he also served as chief of operations and plans for the Navy's carrier task force in Southeast Asia. Principal shore assignments were with the Navy's Operational Test and Evaluation Force and the Office of the Assistant Secretary of Defense (Systems Analysis), and as

chief of studies, analysis and war gaming for the Joint Chiefs of Staff.

In other business activities, Adm Robert Gormley is President of The Oceanus Company, a technology advisory and business development firm serving clients in the fields of aerospace, defense and electronics. He also is a Senior Vice President of Projects International, Inc, a Washington-based firm working to develop international trade and create investment opportunities for its clients. Special interests include airborne reconnaissance, unmanned aerial vehicles (UAV), vertical/short take-off and landing aircraft, air traffic control, weapon system combat survivability, military requirements formulation, and test and evaluation planning.

A regular participant in national security studies undertaken by the National Research Council, Admiral Gormley has also been a member of study panels of the Defense Science Board and the Naval Research Advisory Committee. Study subjects include reconnaissance and surveillance, unmanned aerial vehicles, counterterrorism, network-centric operations, tactical air warfare, fire support for amphibious operations, technology for future naval forces, aircraft carrier technology, mine warfare, and regional/littoral warfare.

Adm Gormley also was a long-time advisor to the Joint Technical Coordinating Group on Aircraft Survivability (now the Joint Aircraft Survivability Program). His early efforts with the Group focused on increasing the awareness of combat survivability among senior uniformed and civilian officials of the Military Services and Department of Defense. All who know him know how successful he was in these endeavors, and the survivability community applauds his efforts!

The leadership of Adm Gormley will be sorely missed by the Division's Executive Board. However, he has promised that his interest in weapon system combat survivability remains as keen as ever, and he will continue to be engaged with the crucial issues facing the survivability community, our combat forces and the nation.

Date set for 2005 SURVIAC Survivability Analysis Workshop

SURVIAC will host a Survivability Analysis workshop on 4-8 April 2005 at Wright-Patterson Air Force Base, Ohio. This workshop will focus on the needs of the analyst as well as "how-to-do-it" analysis, stringing together a variety of models, data sources, and analytic judgement into a comprehensive survivability analysis. The workshop attempts to fucus primarily on the specifics of models typically used in survivability analysis.

The first day of the workshop will consist of an introduction to the aircraft survivability discipline. Mission, threats and threat effects, and survivability assessment will also be covered. On later days the workshop will progress through elements of a sample survivability analysis. We will discuss each part of a comprehensive survivability analysis including vulnerability, susceptibility, engagement, mission, and campaign analysis. At each step in the analysis we will present information on the typical models used, their respective assumptions, limitations, and typical results. There will be discussions on available data sources and resources, and agencies to assist you with further training as needed and will point out common problems that you may encounter. We will also highlight tricks of the trade or small helper programs to assist you in reformatting data, graphically display data and results, and to maintain a sanity check as you progress through a typical analysis.

Who should attend this workshop? Midlevel managers from government and industry who supervise studies entailing survivability analysis techniques; project and task managers who need a better understanding of what analysis capabilities are available; and Government and industry engineers, analysts, and programmers who furnish simulation input will find this course helpful in future decision processes.

The Survivability Analysis Workshop is classified. This workshop is open to U.S. Government organizations and their contractors. Registration and security clearance information will be available on our website at http://iac.dtic.mil/surviac. For further information, please contact Linda Ryan, (937) 255-3828 ext. 208, E-mail liryan@bah.com.

NOTE: this workshop was previously scheduled for November 2004 but was moved due to conflicts.

SURVIAC Distributes Three New Products

Night Vision Goggle (NVG) Rocket Propelled Grenade (RPG) Quick Look Report (QLR) CD-ROM

In response to requests within the Army and Marine aviation communities, ARL/NAVAIR has prepared a Rocket Propelled Grenade (RPG) Launch and Detonation Characterization Video to be used as a training aid for combat aircrew. The effort was sponsored by the Joint Aircraft Survivability Program Office (JASPO), Project Number V-04-13.

ARL/NAVAIR, in conjunction with the Aberdeen Test Center (ATC), fired actual threat RPGs to emulate shots at a flying helicopter. A target was suspended 75 ft above the ground, and the RPGs were fired individually from a fixed-launcher located at ground level 150 m from the target. A single shot was conducted during daytime hours and six shots were also conducted at night. Standard video cameras were strategically placed to capture various views of the launch, trajectory and impact of the RPGs. Some of the cameras were outfitted with the F4949R Night Vision Goggle (NVG) or the F4949G (Leaky Green) NVG, and a Forward Looking Infrared Camera was also utilized. This video is the first of its kind to aid helicopter crews identify RPG threats being encountered in Iraq. This video is now in use as a training aid in IRAQ.

The cost of this CD to contractors is $50.00. It is free to U.S. Government.

Computerized Geometric Information to Support Vulnerability Assessments State-of-the-Art Report (SOAR)

Computerized geometric descriptions of combat systems are a key input for analytical models used to conduct vulnerability and other survivability studies. These descriptions contain the spatial relationship of key system components and additional information such as component descriptions to provide detailed information regarding components encountered along a threat trajectory, line-of-sight thickness, entrance and/or exit obliquity, etc. This information is then used within analytical methods and models to compute metrics for quantifying the vulnerability of systems.

However, there are unique requirements and preferences among members of the vulnerability community. For example, the data sources, means of developing and storing, data and methods of interrogating the computerized geometric information vary among different organizations within the community.

Advancement of the computer industry has also had a major effect on many aspects of vulnerability analysis. New sources of geometric information, advancement of commercial CAD programs to design new systems, and advanced computer applications for the processing of geometric data are a few examples. The new resources available and the need to eliminate the development of multiple geometric descriptions of the same systems o support different analyses are challenging the community to find smarter, more efficient means of handling this geometric information

This state-of-the-art report has been developed to examine the geometry methods and resources available to support vulnerability studies and to evaluate how these methods and resources meet the needs of the vulnerability community.

The cost of this report is $75.00.

State-of-the-Art Report (SOAR) for Non-Lethal Weapon (NLW) Assessment Methodologies

Today's armed forces are being presented with a variety of military operations that are considered unconventional. These operations include peacekeeping, humanitarian relief, covert operations, hostage rescue, riot control, and various situations where it is politically undesirable to kill civilians. These situations are referred to as Military Operations Other Than War (MOOTW). For most of these encounters, our soldiers need weapons that are designed to incapacitate people and vehicles without necessarily causing death. There are situations where the use of non-lethal weapons (NLWs) is the most desirable t avoid public opinion backlash against the use of lethal force. Political, diplomatic, and economic demands dictate that future operations, where possible, minimize U.S. casualties while limiting collateral civilian casualties and materiel damage.

A rational methodology is needed to guide the selection of non-lethal technologies that offer the greatest promise for various mission applications. Commanders will also need a methodology to select the best NLW for a particular circumstance. Limiting collateral damage is a key component of many war-fighting missions, and NLWs may have a key role in many of these missions. Therefore, a state-of-the-art report (SOAR) is needed to identify information related to existing and developmental NLW assessment tools

Products continued on page 11

The Joint Aircraft Survivability Program Office (JASPO) Model User Meeting (JMUM)

The Joint Aircraft Survivability Program Office (JASPO) Model User Meeting (JMUM) 2004 was held on 22-25 June 2004 at the United States Air Force Academy in Colorado Springs, Colorado. This was the ninth annual combined users meeting that the Survivability/Vulnerability Information Analysis Center (SURVIAC) has executed and the JASPO has funded. The models included in the JMUM are:

- ALARM - Advanced Low Altitude Radar Model
- BLUEMAX - Flight Path Generator
- BRAWLER - Air-to-Air Combat Model
- COVART - Computation of Vulnerable Areas and Repair Times
- ESAMS - Enhanced Surface-to-Air Missile Simulation
- FASTGEN - Fast Shotline Generator
- MIL AASPEM – Man In the Loop Air-to-Air System Performance Evaluation Model
- RADGUNS - Radar Directed Guns Simulation

115 representatives participated in this year's meeting from various services and DoD contractors.

The format of JMUM included two days of general session, followed by two days of breakout sessions. The general session started with a welcome briefing from the United States Air Force Academy followed by JASPO and SURVIAC overview briefings. Technical briefs, model status as well as different modeling tools and capabilities followed in the general session. Model specific topics were discussed during each of the breakout sessions. Each breakout session presented in depth technical briefings for each of the models and their future schedules were discussed. The breakout sessions included formal presentations and working forums for the users. The breakout sessions also included Configuration Control Board (CCB) meetings. The users and the CCB members were involved in discussing software changes, which were voted on for incorporation into the model by the CCB members. Having the users present during the CCB discussions has proven to be invaluable. The user can provide information that would otherwise not be available for discussion. A CD containing each of the unclassified briefings, attendees list and the minutes of all sessions has been provided to all attendees. Other interested people can obtain the CD from SURVIAC by contacting Mr. A.J. Brown, (937) 255-3828 ext. 284, DSN: 785-3828 ext. 284, or E-mail: brown_aj@bah.com. The cost of the CD is $50.00

JMUM CD available from SURVIAC

JMUM is an excellent networking event for the JASPO and SURVIAC models users. This is an informative meeting for everyone who is interested in the JMUM model suite. The meeting promotes open discussions on hardware and software issues related to each of the JMUM models. JMUM 2005 has been tentatively schedule for 14-17 June 2005. The meeting will be held at the United States Air Force Academy in Colorado Springs, Colorado. If you would like to be added to the agenda for JMUM 2005 or if you would like more information on JMUM 2005 please contact Paul Jeng at (937) 255-3828 x273 or E-mail: jeng_paul@bah.com.

Products continued from page 10

(including how they work and their limitation) and to gather measure of effectiveness (MOEs) that can serve as yardsticks to compare NLWs.

The cost of this report is $50.00.

If you would like to order one of these new products please contact Mr. A.J. Brown, (937) 255-3828 ext. 284, DSN: 785-3828 ext. 284, E-mail: brown_aj@bah.com.

SURVIAC Product Availability

SURVIAC is a U.S. Department of Defense Information Analysis Center (IAC) sponsored by the Defense Technical Information Center (DTIC)

Product	Reproduction & Handling Fee
A Critical Review of Graphite Epoxy Laser Damage Studies	$ 50.00
A Summary of Aerospace Vehicle Computerized Geometric Descriptions of Vulnerability Analyses	$100.00 (Free to Govt.)
Advanced Materials for Enhanced Survivability	$100.00
Aircraft Fuel System Fire and Explosion Suppression Design Guide	$150.00 (3 volumes)
“Aircraft Survivability” Video	$ 50.00 (or 30-day loan)
Alternatives For Halon 1301 In Army Ground Vehicle Firefighting Systems	$250.00
An Overview of Laser-Induced Eye Effects	$150.00
An Overview of Laser Technology and Applications	$ 50.00
“Battle Damage Repair of Composite Structures” Video	$ 75.00
Collection of Vulnerability Test Results for Typical Aircraft Systems and Components	$150.00
Comparative Close Air Support Vulnerability Assessment Study - Executive Summary	None (Govt Only)
Compendium of References for Nonnuclear Aircraft Survivability (A Supplement to MIL-HDBK-336)	$150.00
Component Vulnerability Analysis Archive (CVAA) and Workshop Notes	$300.00 (Free to Govt.)
Component Vulnerability (Pd/h) Workshop Component Pd/h Handbook w/addendum	$200.00 (Free to Govt.)
Component Vulnerability Database Development - CD	$100.00 (Free to Govt.)
Computerized Geometric Information to Support Vulnerability Assessments (SOAR)	$ 75.00
Countermeasures Handbook for Aircraft Survivability (3 Volumes)	$200.00 (Free to Govt.)
Critical Review and Technology Assessment (CRTA) for Soldier Survivability (SSv)	$ 50.00
‘Designing for Survivability’ Video	30-Day Loan
Directed Energy Effectiveness Modeling State-of-the-Art Report (SOAR)	$ 50.00
Gas Explosion Suppression Agent Investigation	$200.00
Gun and Missile Pedigree Threat Reports - CD	$150.00
Joint Live Fire/Live Fire Test Program Catalogue, Version 3.1	$ 95.00
MANPADS Threat to Aircraft: A Vulnerability Perspective - Final Report	$200.00
Model User Group Meeting Minutes - CD	$ 50.00
Munition Response State-of-the-Art Report (SOAR)	$ 50.00
National MANPADS Workshop: A Vulnerability Perspective Proceedings - 2 Volumes	$200.00
Night Vision Goggle Rocket Propelled Grenade Quick Look Report - CD-ROM	$ 50.00 (Free to Govt.)
Penetration Characteristics of Advanced Engine Materials	$100.00
Proceedings of the Eighth DOD Conference on DEW Vulnerability, Survivability and Effects - 2 Volumes	$125.00 (per set)
RADGUNS 1.8 Parametric Study	$100.00 (Free to Govt.)
Ship Survivability Overview	$ 50.00
State-of-the-Art Report for non-Lethal Weapon (NLW) Assessment Methodologies	$ 50.00
“SURVIAC - A Capabilities Overview” Video	30-Day Loan
Survivability Analysis Workshop Notebook - 2000	$100.00 (Free to Govt.)
Survivability Systems Master Plan	$ 50.00 (Free to Govt.)
Testing of Aircraft or Aircraft Surrogates with On-Board Munitions	$100.00
“Threat Effects in Aircraft Combat Survivability" Video	$150.00 (or 60-day loan)
Threat Warheads and Effects/Battle Damage Assessment and Repair Archival and Retrieval (TWE/BDAR) System	$300.00
Ullage Explosion Hazard State-of-the-Art Report (SOAR)	$200.00
Unmanned Aerial Vehicles Survivability Compendium—Interim Report Database	$200.00
U.S. Air Force Surface-To-Air Engagements During Operation Desert Storm	$100.00 (Free to Govt.)
Vulnerability Reduction Design Guide for Ground Systems in a Conventional Combat Environment	$200.00

For further information on how to obtain these products and how to establish need-to-know certification, please contact SURVIAC at (937) 255-3828 x284 or DSN 785-3828 x284. Requests from non-U.S. agencies must be forwarded to their country's Embassy in Washington DC, Attn: Air Attache's Office.

SURVIAC Model Availability

SURVIAC is a U.S. Department of Defense Information Analysis Center (IAC) sponsored by the Defense Technical Information Center (DTIC)

Product	Reproduction & Handling Fee
AIRADE 7.4—Airborne Radar Detection Model	$500.00
ALARM 5.0—Advanced Low Altitude Radar Model (Includes EARCE 2.5)	$500.00
BLUEMAX 5 version 1.0—Variable Airspeed Flight Path Generator	$500.00
BRAWLER 6.5.1—Air-To-Air Combat Simulation	$500.00
*BRL-CAD 6—Ballistic Research Laboratory Computer-Aided Design Package	$500.00
**COVART 4.3—Computation of Vulnerable Area and Repair Time	$500.00
DIME 2.1—Digital Integrated Modeling Environment	$500.00
ESAMS 3.1—Enhanced Surface-To-Air Missile Simulation	$500.00
**FASTGEN 4.7—Fast Shotline Generator	$500.00
FATEPEN—Fast Air Target Encounter Penetration Program	$500.00
IVIEW 2000—Graphical User Interface for Output Simulation	$100.00
JSEM - Joint Service Endgame Model	$500.00
LELAWS 3.0—Low Energy Laser Weapons Simulation	$500.00
MIL-AASPEM 5.3 — Man-in-the-Loop Air-To-Air System Performance Evaluation Model	$500.00
RADGUNS 2.4—Radar-Directed Gun System Simulation	$500.00
TRAP 3.1a—Trajectory Analysis Program	$500.00
TRACES 3.0.4—Terrain/Rotorcraft Air Combat Evaluation Simulation	$500.00
* For more information regarding BRL-CAD documentation contact Mr. Dwayne Kregel at the SURVIAC Aberdeen Satellite Office, (410) 273-7722.	
** Model is now part of the Vulnerability Tool Kit	

For further information on how to obtain these products and how to establish need-to-know certification, please contact SURVIAC at (937) 255-3828 x284 or DSN 785-3828 x284. Requests from non-U.S. agencies must be forwarded to their country's Embassy in Washington DC, Attn: Air Attache's Office.

Calendar of Events

March 2004

MANPADS Week: Sea Air Space Exposition 2005
22-24 March 2005
Washington, DC
POC: Brian Plunkett, 850-882-9389, www.navyleague.org

22nd Aerospace Testing Seminar
22-24 March 2005
Manhattan Beach, California
POC: http://www.aero.org/conferences/ats/

15th Annual Advanced Technology Electronic Defense Systems (ATEDS) Review
22-24 March 2004
San Diego, California
POC: Jack Kress, (812) 279-9195, E-mail: JackKress@ATEDS.com; www.ateds.com

4th C4ISR Interoperability Test & Evaluation
29-31 March 2005
Oxnard, California
POC: Christopher Weal, (805) 989-7947, E-mail: christopher.weal@navy.mil, www.itea.org

April 2004

21st Annual Space Symposium
4-7 April 2005
Colorado Springs, Colorado
POC: http://www.spacesymposium.org/

SURVIAC Survivability Analysis Workshop
4-8 April 2005
Wright-Patterson AFB, Ohio
POC: SURVIAC, Paul Jeng, (937) 255-3828 x 273, E-mail: jeng_paul@bah.com

49th Annual Fuze Conference
5-7 April 2005
Seattle, Washington
POC: NDIA, Christy O'Hara, (703) 247-2586, E-mail: cohara@ndia.org, www.ndia.org

3rd U.S. Missile Defense Conference & Exhibit
11-15 April 2005
Washington, DC
POC: http://www.aiaa.org/content.cfmm

16th Annual Ground Vehicle Survivability Symposium
11-15 April 2005
Monterey, California
POC: SURVIAC, Lisa Lynch, (586) 978-8000, E-mail: Lynch_lisa@bah.com

46th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference
18-21 April 2005
Austin, Texas
POC: AIAA, (800) 639-2422, E-mail: custserv@aiaa.org, www.aiaa.org

Verification, Validation & Accreditation Short Course
19-21 April 2005
Fairfax, Virginia
POC: Jean Shivar, (703) 631-6121, E-mail: jshivar@itea.org, www.itea.org

“Aircraft Fire and Explosion Due to Accidents, Combat and Terrorist Attacks”, 6th Annual BlazeTech Course
19-21 April 2005
Woburn, Massachusetts
POC:BlazeTech Corp., Albert Moussa, (617)-661-0700 x10, E-mail: firecourse@blazetech.com, www.blazetech.com

3rd Responsive Space Conference and Workshop
25-28 April 2005
Los Angeles, California
POC: http://www.responsivespace.com

40th Annual GUN & Ammo/Missiles & Rocket Conf/Expo
25-28 April 2005
New Orleans, Lousiana
POC: NDIA, Phyllis Edmonson, E-mail: pedmonson@ndia.org

May 2005

AAAA Annual Convention
6-11 May 2005
Orlando, Florida
POC: AAAA, (203) 268-2450, www.quad-a.org

51st Annual Small Arms Conf/Expo
16-19 May 2005
Atlantic City, New Jersey
POC: NDIA, Veronica Allen, (703) 247-2570, E-mail: vallen@ndia.org, www.ndia.org

June 2005

Intelligent Ships VI Symposium 2005
1-2 June 2005
Villanova, Pennsylvania
POC: Megan Sinesiou, (703) 836-6727, E-mail: msinesiou@navalengineers.org, www.navalengineers.org

Unmanned Aerial Vehicle Missions, Links and Payloads
13-17 June 2005
San Diego, California
POC: AOC, (703) 549-1600 or (888) OLD-CROW, www.crows.org

JMUM
14-17 June 2005
Colorado Springs, Colorado
POC: SURVIAC, Paul Jeng, (937) 255-3828 x 273, E-mail: jeng_paul@bah.com

July 2005

JASP Survivability Short Course
26-28 July 2005
Wright-Patterson AFB, Ohio
POC: JASP, Darnell Marbury, (703) 607-3509 x10, E-mail: darnell.marbury@navy.mil, http://jas.jcs.mil

September 2005

Space Policy and Architecture Symposium, "Challenges in Space"
22-23 September 2005
Washington, DC
POC: NDIA, Christy O'Hara, (703) 247-2586, E-mail: cohara@ndia.org , www.ndia.org

October 2005

42nd Annual AOC International Symposium and Convention
23-26 October 2005
Virginia Beach, Virginia
POC: AOC, (703) 549-1600 or (888) OLD-CROW, www.crows.org

Aircraft Survivability 2005 "Air Vehicle Survivability Against New Global Threats"
31 October - 3 November 2005
Naval Postgraduate School, Monterey, California
POC: NDIA, Ann Saliski, (703) 247-2577, E-mail: asaliski@ndia.org, www.ndia.org

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